Teacher's Scoring Guide

Grade 9
Mathematics

Fall 2006

Indiana Statewide Testing for Educational Progress

48879-W

INTRODUCTION

During the fall of 2006, Indiana students in Grades 3 through 10 participated in the administration of *ISTEP+*. The test for *ISTEP+* Fall 2006 consisted of a multiple-choice section and an applied skills section. For the fall testing, the multiple-choice section was machine-scored. The applied skills section, which consisted of open-ended questions, was hand-scored.

The test results for both the multiple-choice and the applied skills sections were returned to the schools in early December 2006. Copies of student responses to the open-ended questions were also returned to the schools in early December 2006. It is the expectation of the Indiana Department of Education that schools will take this opportunity to invite students and parents to sit down with teachers to discuss the results. To support this endeavor, the Indiana Department of Education has prepared the following *Teacher's Scoring Guide*. The purpose of this guide is to help teachers

- understand the methods used to score the *ISTEP+* Fall 2006 applied skills section, and
- discuss and interpret these results with students and parents.

In order to use this guide effectively, you will also need the Student Report and a copy of the student's work.

For Grade 9, there are two scoring guides: English/Language Arts and Mathematics. In this Mathematics guide, you will find

- an introduction,
- a list of the Mathematics Grade 8 Indiana Academic Standards,*
- rubrics (scoring rules) used to score the open-ended questions,
- anchor papers that are actual examples of student work (transcribed in this guide for clarity and ease of reading), and
- descriptions of the ways in which the response meets the rubric criteria for each of the score points.

When you review the contents of the scoring guide, keep in mind that this guide is an overview. If you have questions, write via e-mail (istep@doe.state.in.us) or call the Indiana Department of Education at (317) 232-9050.

* Because *ISTEP+* is administered early in the fall, the Grade 9 test is based on the academic standards through Grade 8.

INTRODUCTION TO THE MATHEMATICS APPLIED SKILLS SECTION

The applied skills section that students responded to this past fall in Grade 9 allowed the students to demonstrate their understanding of Mathematics in a variety of ways, such as using a ruler, explaining a solution, transforming a figure, or interpreting a table or graph.

STRUCTURE

The applied skills section for Grade 9 Mathematics was divided into two tests, Test 7 and Test 8. Each test consisted of eight open-ended questions.

SCORING

Each open-ended question was scored according to its own rubric. A rubric is a description of student performance that clearly articulates the requirements for each of the score points. Scoring rubrics are essential because they ensure that all papers are scored objectively. Each rubric for this administration of the *ISTEP+* Grade 9 Mathematics assessment has a maximum possible score of one to three score points.

NOTE: Images of the questions and student work have been reduced to fit the format of this guide.

Rubrics are established prior to testing to describe the performance criteria for each score point. The performance criteria determine the number of score points possible for each question. This process ensures that all responses are judged objectively.

1. Students should not be penalized for omitting
   - degree symbols
   - dollar signs ($) or cent signs (¢)
   - zeros for place holders; for example, either 0.75 or .750 could be used
   - labels for word problems; for example, *miles*

     NOTE: Students WILL be penalized for use of incorrect labels.

2. Students should not be penalized for
   - spelling or grammar errors
   - using abbreviations; for example, *ft* or *feet* would be acceptable

3. Students should be given credit for
   - entries in the workspace that indicate understanding of a complete process even if the response on the answer line is incorrect (i.e., the student would receive partial credit for questions with rubrics that allow for scoring the work).
   - answers not written on the answer line; for example, an answer could be given in the workspace or in the explanation (however, in some cases, because of the multiple calculations in the workspace, placement of an answer on the answer line is necessary to determine which result the student intended). Students WILL be penalized for incorrect answers written on the answer line even if the correct answer appears in the workspace.

CONDITION CODES

If a response is unscorable, it is assigned one of the following condition codes:

A Blank/No response/Refusal
B Illegible
C Written predominantly in a language other than English
D Insufficient response/Copied from text

MATHEMATICS GRADE 8
INDIANA ACADEMIC STANDARDS

- **Number Sense**
  Students know the properties of rational and irrational numbers expressed in a variety of forms. They understand and use exponents, powers, and roots.

- **Computation**
  Students compute with rational numbers expressed in a variety of forms. They solve problems involving ratios, proportions, and percentages.

- **Algebra and Functions**
  Students solve simple linear equations and inequalities. They interpret and evaluate expressions involving integer powers. They graph and interpret functions. They understand the concepts of slope and rate.

- **Geometry**
  Students deepen their understanding of plane and solid geometric shapes and properties by constructing shapes that meet given conditions, by identifying attributes of shapes, and by applying geometric concepts to solve problems.

- **Measurement**
  Students convert between units of measure and use rates and scale factors to solve problems. They compute the perimeter, area, and volume of geometric objects. They investigate how perimeter, area, and volume are affected by changes of scale.

- **Data Analysis and Probability**
  Students collect, organize, represent, and interpret relationships in data sets that have one or more variables. They determine probabilities and use them to make predictions about events.

- **Problem Solving**
  Students make decisions about how to approach problems and communicate their ideas. Students use strategies, skills, and concepts in finding and communicating solutions to problems. Students determine when a solution is complete and reasonable, and move beyond a particular problem by generalizing to other situations.

Problem Solving is identified as a Process Skill in the Indiana Academic Standards. To ensure that the *ISTEP+* questions that assess this Process Skill are grade-appropriate and that the questions use skills that are contained in the standards, these questions are developed by including at least two different indicators from Content Skills in addition to the indicator from the Process Skill. Some of the Content Standards included in the Content Skills are Computation, Geometry, and Algebra. The additional indicators may be from the same or different Content Skills.

NOTE: For the Process Skill questions, score points are awarded **only** for the Process Skill, not for the Content Skills associated with the question.

The Content Skills used for each of the Process Skill questions in the Grade 9 applied skills section are shown in the following chart.

PROCESS SKILL QUESTIONS

Question	Process Skill (score points awarded)	Content Skills (score points **not** awarded) *Item may map to more than one indicator in a standard.*
Test 7		
6	Problem Solving	Number Sense, Number Sense
Test 8		
3	Problem Solving	Geometry, Measurement
5	Problem Solving	Computation, Measurement

Test 7—Question 1: Data Analysis and Probability

1 The table below shows Leah's bowling scores.

Bowling Scores

77	79	88	83	85	92	76	88
90	95	99	100	97	99	88	94

Use the data to create a stem-and-leaf plot.

Bowling Scores

Stem	Leaf

Exemplary Response:

- **Bowling Scores**

Stem	Leaf
7	6 7 9
8	3 5 8 8 8
9	0 2 4 5 7 9 9
10	0

KEY
7|6 = 76

OR

- Other valid response

Rubric:

2 points	Exemplary response
1 point	Thirteen to fifteen correct entries
0 points	Other

SCORE POINT 2

1 The table below shows Leah's bowling scores.

Bowling Scores

77	79	88	83	85	92	76	88
90	95	99	100	97	99	88	94

Use the data to create a stem-and-leaf plot.

Bowling Scores 7 | 9 = 79

Stem	Leaf
7	6 7 9
8	3 5 8 8 8
9	0 2 4 5 7 9 9
10	0

Test 7—Question 1
Score Point 2

This response matches the exemplary response contained in the rubric. The student correctly recorded all the data points in the stem-and-leaf plot. The response receives a Score Point 2.

SCORE POINT 1

1 The table below shows Leah's bowling scores.

Bowling Scores

77	79	88	83	85	92	76	88
90	95	99	100	97	99	88	94

Use the data to create a stem-and-leaf plot.

Bowling Scores

Stem	Leaf
7	6, 7, 9
8	3, 5, 8, 8, 8
9	0, 2, 4, 5, 7, 9, 9
1	00

Test 7—Question 1
Score Point 1

This response shows 15 of the 16 data points correctly recorded. The student does not correctly record 100. Therefore, this response receives a Score Point 1.

Test 7—Question 1
Score Point 0

This response shows that the student recorded the entire bowling score value under the leaf column, resulting in 20 incorrect data points. Therefore, this response receives a Score Point 0.

SCORE POINT 0

1 The table below shows Leah's bowling scores.

Bowling Scores

77	79	88	83	85	92	76	88
90	95	99	100	97	99	88	94

Use the data to create a stem-and-leaf plot.

Bowling Scores

Stem	Leaf
7	76 77 79
8	83 85 88 88 88
9	90 92 94 95 97 99 99
10	100

Test 7—Question 2: Algebra and Functions

2 What is the slope of the equation $4x - 3y = 12$?

Show All Work

Answer _____

Exemplary Response:

- $\frac{4}{3}$

Sample Process:

- $4x - 3y = 12$

$$-3y = -4x + 12$$

$$3y = 4x - 12$$

$$y = \frac{4}{3}x - 4$$

so M $= \frac{4}{3}$

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation OR Slope-intercept form only
0 points	Other

Test 7—Question 2
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows a correct slope of $\frac{4}{3}$ or $1\frac{1}{3}$ on the answer line. The student also gives a correct complete process, but it is not required. The response receives a Score Point 2.

SCORE POINT 2

2 What is the slope of the equation $4x - 3y = 12$?

Show All Work

$$\frac{-3y}{-3} = \frac{-4x}{-3} \quad \frac{+12}{-3}$$

$$y = \frac{4}{3}x - 4$$

Answer $\frac{4}{3}$ or $1\frac{1}{3}$

Test 7—Question 2
Score Point 1

This response shows a correct process for finding the slope of the equation. However, the student shows an incorrect answer on the answer line. The student writes the equation in slope-intercept form on the answer line instead of writing only the slope. Therefore, this response receives a Score Point 1.

SCORE POINT 1

2 What is the slope of the equation $4x - 3y = 12$?

Show All Work

$$-3y = -4x + 12$$
$$y = {}^4/_3x - 4$$

Answer $y = {}^4/_3x - 4$

Test 7—Question 2
Score Point 0

This response shows an incorrect slope and no process to determine the slope. Therefore, this response receives a Score Point 0.

SCORE POINT 0

2 What is the slope of the equation $4x - 3y = 12$?

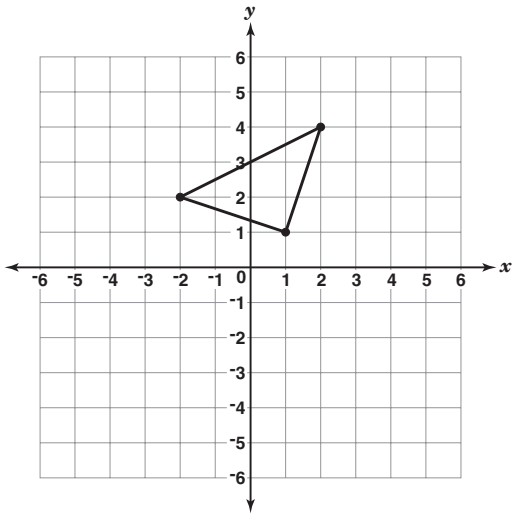
Show All Work

$$y = mx + b$$

Answer 4

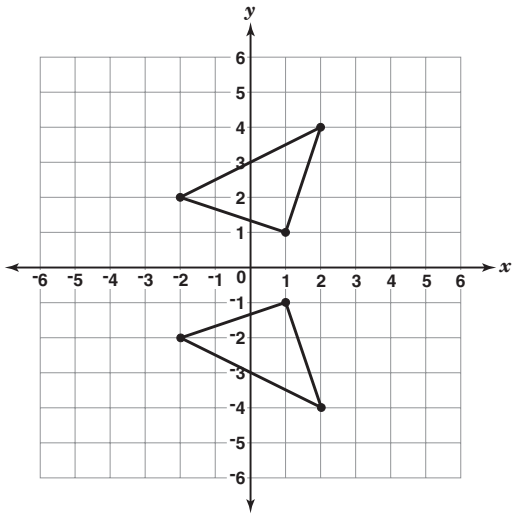
Test 7—Question 3: Geometry

3 Look at the figure on the grid below.



Draw the figure on the grid reflected over the x-axis.

Exemplary Response:

- 

Rubric:

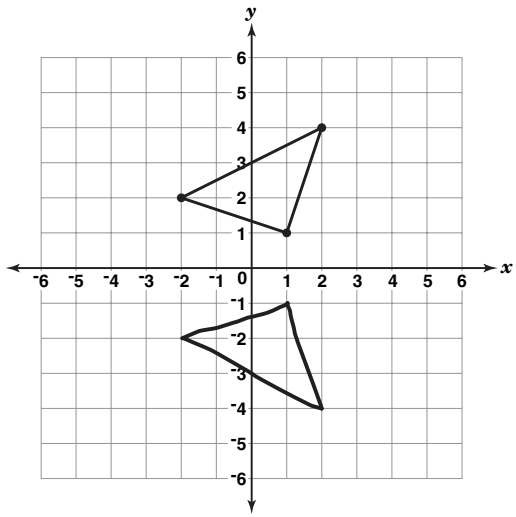
1 point	Exemplary response
0 points	Other

Test 7—Question 3
Score Point 1

This response matches the exemplary response contained in the rubric. The student shows the correct reflection of the figure over the *x*-axis. The response receives a Score Point 1.

SCORE POINT 1

3 Look at the figure on the grid below.



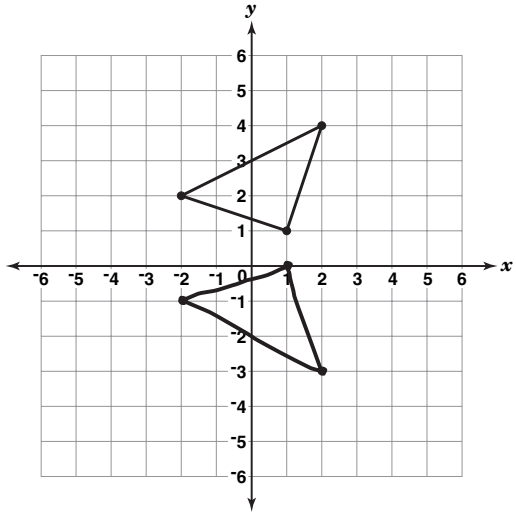
Draw the figure on the grid reflected over the x-axis.

Test 7—Question 3
Score Point 0

This response shows an incorrect reflection of the figure over the *x*-axis. Therefore, this response receives a Score Point 0.

SCORE POINT 0

3 Look at the figure on the grid below.



Draw the figure on the grid reflected over the x-axis.

Test 7—Question 4: Data Analysis and Probability

4 The data below show the number of people entering a store during the first hour of operation for a 16-day period.

58 32 20 73 66 28 23 45 87 65 48 77 26 38 44 72

On the lines below, explain how to determine the median of the data.

_____

_____

_____

_____

Now use the method you described above to determine the median number of people. Write your answer on the line below.

Show All Work

Answer _____ people

Exemplary Response:

Explanation equivalent to the following:

- Put the data in order. Find the middle value. Since there is an even number of data, you have to find the mean of the 2 middle values.

OR

- Other valid explanation

AND

- 46.5 people

NOTE: Award credit if the correct answer appears in the explanation, but the answer line is blank.

Rubric:

2 points	Exemplary response
1 point	One correct component
0 points	Other

SCORE POINT 2

4 The data below show the number of people entering a store during the first hour of operation for a 16-day period.

58 32 20 73 66 28 23 45 87 65 48 77 26 38 44 72

On the lines below, explain how to determine the median of the data.

Arrange the numbers in order from smallest to largest. Then add the two middle numbers and divide their sum by 2.

Now use the method you described above to determine the median number of people. Write your answer on the line below.

Show All Work

20, 23, 26, 28, 32, 38, 44, 45, 48, 58, 65, 66, 72, 73, 77, 87

45 + 48 = 93

$$2\overline{)93.0} \quad 46.5 \text{ people}$$

$$-8$$

$$13$$

$$-12$$

$$10$$

Answer 46.5 people

Test 7—Question 4
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows a correct explanation for determining the median of the data and a correct answer of 46.5 people. The response receives a Score Point 2.

Test 7—Question 4
Score Point 1

This response shows a correct answer, but an incomplete explanation. The explanation does not state that because there is an even number of data points, the average of the two middle numbers must be found to obtain the median. Therefore, this response receives a Score Point 1.

SCORE POINT 1

4 The data below show the number of people entering a store during the first hour of operation for a 16-day period.

~~58~~ ~~32~~ ~~20~~ ~~78~~ ~~66~~ ~~28~~ ~~23~~ ~~45~~ 87 ~~65~~ ~~48~~ 77 ~~26~~ ~~38~~ ~~44~~ ~~72~~

On the lines below, explain how to determine the median of the data.

You put them in numerical order first. Then you cross off one at the front and one at the end until you get to the middle.

Now use the method you described above to determine the median number of people. Write your answer on the line below.

Show All Work

~~20~~, ~~23~~, ~~26~~, ~~28~~, ~~32~~, ~~38~~, ~~44~~, 45, ~~48~~, ~~58~~, ~~65~~, ~~66~~, ~~72~~, ~~73~~, ~~77~~, ~~87~~

$$2\overline{)930} = 46.5$$

8
13
12
10

$$\begin{array}{r} {\scriptstyle 1}\,48 \\ +\ 45 \\ \hline 93 \end{array}$$

Answer 46.5 people

SCORE POINT 0

4 The data below show the number of people entering a store during the first hour of operation for a 16-day period.

~~38~~ ~~32~~ ~~20~~ ~~73~~ ~~66~~ ~~28~~ ~~23~~ ~~45~~ ~~87~~ ~~65~~ ~~48~~ ~~77~~ ~~26~~ ~~38~~ ~~44~~ ~~72~~

On the lines below, explain how to determine the median of the data.

You would order them from least to greatest then find the middle number.

Now use the method you described above to determine the median number of people. Write your answer on the line below.

Show All Work

~~20~~, ~~23~~, ~~26~~, ~~28~~, ~~32~~, ~~38~~, ~~44~~, 45, ~~48~~, ~~58~~, ~~65~~, ~~66~~, ~~72~~, ~~73~~, ~~77~~, ~~87~~

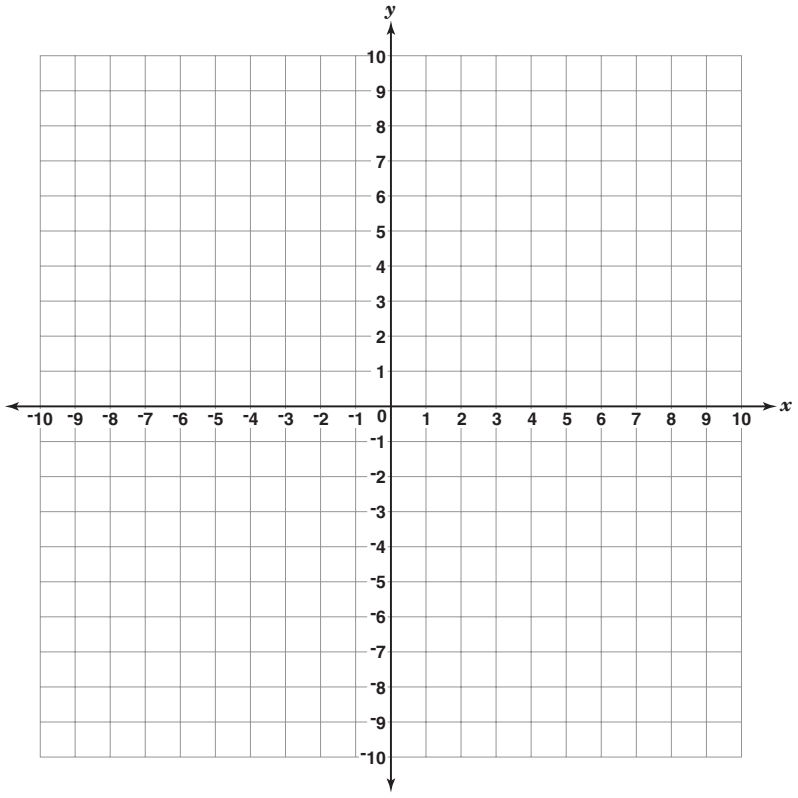
Answer 45 people

Test 7—Question 4
Score Point 0

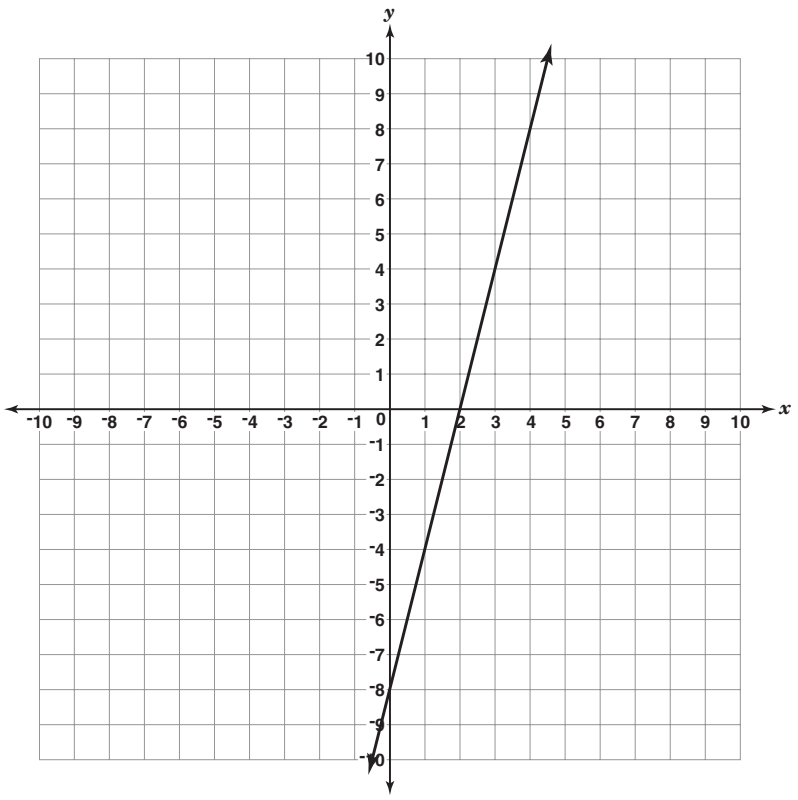
This response shows an incomplete explanation and an incorrect answer. Therefore, this response receives a Score Point 0.

Test 7—Question 5: Algebra and Functions

5 Graph the equation $y = 4x - 8$ on the coordinate plane below.



Exemplary Response:

- 

NOTE: If more than one line is drawn, a score of 0 points will be awarded.

If an incorrect point is plotted with no line drawn, a score of 0 points will be awarded.

Rubric:

2 points Exemplary response

1 point Correct slope of 4 with line drawn

OR

Correct *x*-intercept of 2 or *y*-intercept of $^{-}8$ with line drawn

OR

No line drawn, at least 2 points plotted that would fall on the correct line, and no incorrect points plotted

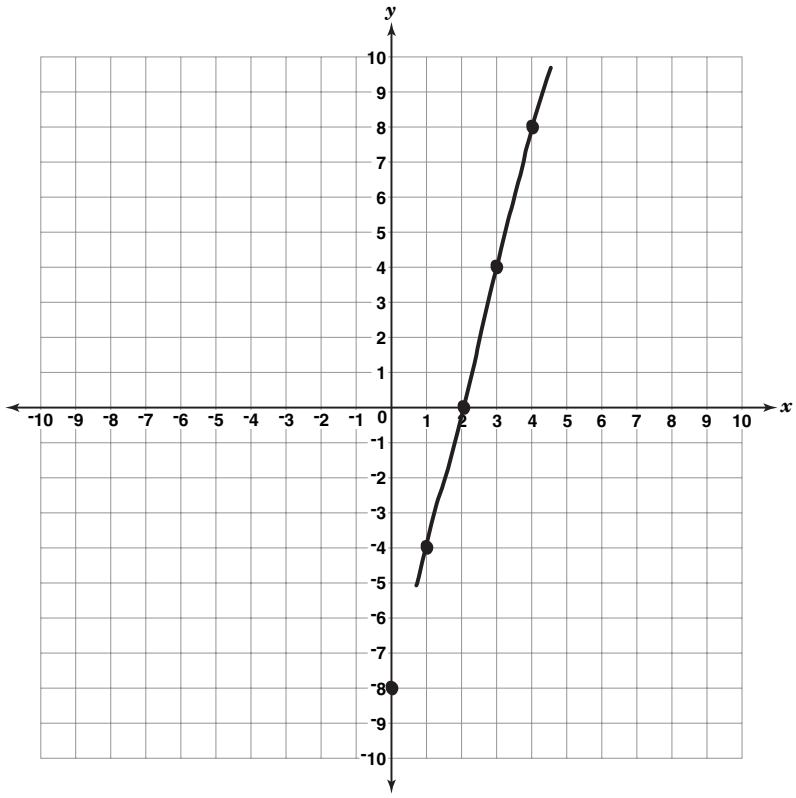
0 points Other

Test 7—Question 5
Score Point 2

This response matches the exemplary response contained in the rubric. The student correctly graphs the equation showing a correct slope of 4 with line drawn and the correct *x*- and *y*-intercepts. The response receives a Score Point 2.

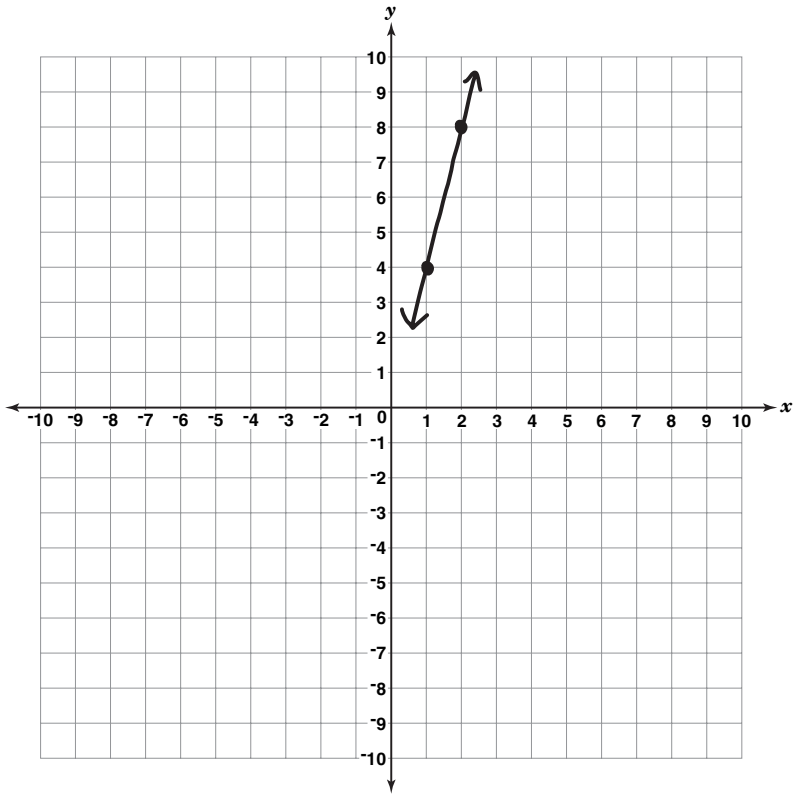
SCORE POINT 2

5 Graph the equation $y = 4x - 8$ on the coordinate plane below.



SCORE POINT 1

5 Graph the equation $y = 4x - 8$ on the coordinate plane below.



Test 7—Question 5 Score Point 1

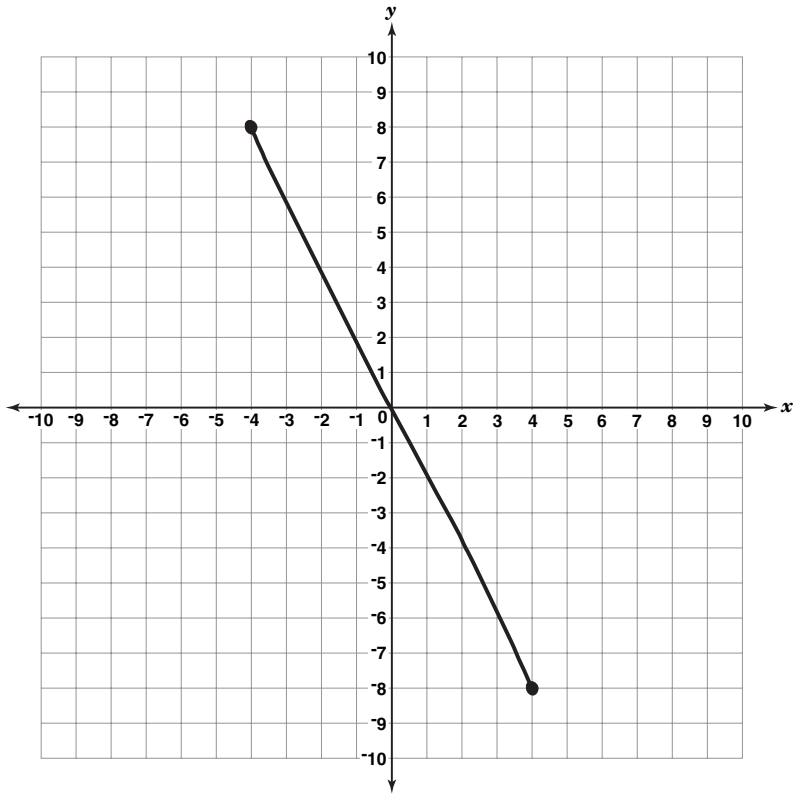
This response shows a line with a slope of 4, but it is not the graph of the given equation. The line drawn has a *y*-intercept of 0 instead of $^{-}8$. Therefore, the response receives a Score Point 1.

Test 7—Question 5
Score Point 0

This response shows an incorrect graph of the equation. The line drawn has incorrect *x*- and *y*-intercepts and an incorrect slope. Therefore, this response receives a Score Point 0.

SCORE POINT 0

5 Graph the equation $y = 4x - 8$ on the coordinate plane below.



Test 7—Question 6: Problem Solving

6 Look at the expression below.

$$\sqrt{2^3 \times 2^3 \times 1.1}$$

Between which two adjacent whole numbers does the value of the expression lie?

Show All Work

Answer _____ and _____

On the lines below, explain how you arrived at your answer.

_____

_____

_____

_____

Exemplary Response:

- 8 and 9

AND

Explanation and process equivalent to the following:

- Since the number is between the square roots of 64 and 81, I know that it has to be between 8 and 9.

Sample Process:

- $\sqrt{2^3 \times 2^3 \times 1.1}$

  $\sqrt{2^6 \times 1.1}$

  $\sqrt{70.4}$

  $\sqrt{64} < \sqrt{70.4} < \sqrt{81}$

  $8 < \sqrt{70.4} < 9$

OR

- Other valid process

NOTE: Award a maximum of 1 point for a correct complete process with an error in computation.

Rubric:

2 points	Exemplary response
1 point	One correct component
0 points	Other

SCORE POINT 2

6 Look at the expression below.

$$\sqrt{2^3 \times 2^3 \times 1.1}$$

Between which two adjacent whole numbers does the value of the expression lie?

Show All Work

$2 \cdot 2 = 4 \cdot 2 = 8 \cdot 8 = 64$

$\sqrt{70.4}$

$\times 1.1$

64

1

640

70.4

Answer 8 and 9

On the lines below, explain how you arrived at your answer.

Multiply 2 by 2 by 2 and get 8. Do that same thing again & get 8. Multiply 8 & 8 & get 64. Multiply 64 x 1.1 = 70.4 then figure that 8 x 8 = 64 & 9 x 9 = 81 so the answer is between 8 & 9.

Test 7—Question 6
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 8 and 9 and a correct explanation of the process for arriving at the answer. The response receives a Score Point 2.

Test 7—Question 6
Score Point 1

This response shows a correct answer of 8 and 9, but an incorrect explanation is given. The explanation is incorrect because the student claims the square root of 8 is 64 and the square root of 9 is 81. Therefore, this response receives a Score Point 1.

SCORE POINT 1

6 Look at the expression below.

$$\sqrt{2^3 \times 2^3 \times 1.1}$$

Between which two adjacent whole numbers does the value of the expression lie?

Show All Work

8 × 8

64
1.1
64
640
70.4

Answer 8 and 9

On the lines below, explain how you arrived at your answer.

I timesed all 3 of the numbers together then realized that the square root of 8 is 64 and square root of 9 is 81, and 70.4 is in between those.

SCORE POINT 0

6 Look at the expression below.

$$\sqrt{2^3 \times 2^3 \times 1.1}$$

Between which two adjacent whole numbers does the value of the expression lie?

Show All Work

$2 \cdot 2 \cdot 2 = 8$ $\sqrt{8 \times 8 \times 1.1}$

64
1.1
64
640
70.4

Answer 8 and 8

On the lines below, explain how you arrived at your answer.

I figured it out by multipling 8 × 8 × 1.1 8 × 8 = 64 and
64 × 1.1 = 70.4, 64 is most of 70.4 so 64 would be the value.

Test 7—Question 6
Score Point 0

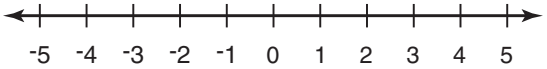
This response shows an incorrect answer and an incorrect explanation. Therefore, this response receives a Score Point 0.

Test 7—Question 7: Algebra and Functions

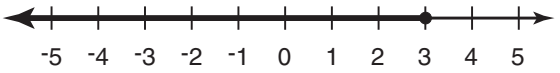
7 Look at the inequality below.

$$x + 1 \leq 4$$

Graph the inequality on the number line.



Exemplary Response:

- 

Rubric:

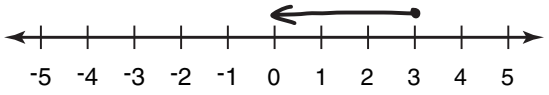
2 points	Exemplary response
1 point	Open circle shown with correct ray drawn, instead of closed circle shown with correct ray drawn
0 points	Other

SCORE POINT 2

7 Look at the inequality below.

$$x + 1 \leq 4$$

Graph the inequality on the number line.



Test 7—Question 7
Score Point 2

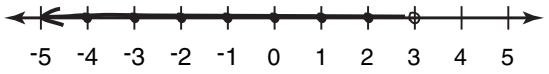
This response matches the exemplary response contained in the rubric. The student shows a correct graph of the inequality with a closed circle shown and a correct ray drawn. The response receives a Score Point 2.

SCORE POINT 1

7 Look at the inequality below.

$$x + 1 \leq 4$$

Graph the inequality on the number line.



Test 7—Question 7
Score Point 1

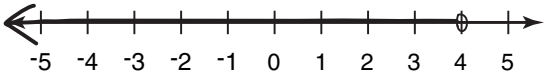
This response contains an incorrect graph of the inequality. The student starts the ray at the correct location and correctly shows the ray continuing to the left. However, the student uses an open circle instead of a solid circle. Therefore, this response receives a Score Point 1.

SCORE POINT 0

7 Look at the inequality below.

$$x + 1 \leq 4$$

Graph the inequality on the number line.



Test 7—Question 7
Score Point 0

This response contains an incorrect graph of the inequality. The student started the graph from 4 on the number line instead of 3. Therefore, this response receives a Score Point 0.

Test 7—Question 8: Algebra and Functions

8 What is the equation of the line that has a slope of $\frac{1}{3}$ and passes through the point (3, 3)? Write the equation on the line below.

Show All Work

Equation _____

Exemplary Response:

- $3y - x = 6$ **or** $y = \frac{1}{3}x + 2$ **or** $y - 3 = \frac{1}{3}(x - 3)$

OR

- Other valid equation

Sample Process:

- $y = mx + b$

  $3 = \frac{1}{3}(3) + b$

  $3 = 1 + b$

  $2 = b$

  $y = \frac{1}{3}x + 2$

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

SCORE POINT 2

8 What is the equation of the line that has a slope of $\frac{1}{3}$ and passes through the point (3, 3)? Write the equation on the line below.

Show All Work

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{1}{3}(x - 3)$

$y - 3 = \frac{1}{3}x - 1$

$+1 \qquad +1$

$y - 2 = \frac{1}{3}x$

$-y \qquad -y$

$-2 = \frac{1}{3}x - y$

$-\frac{1}{3}x$

$y = \frac{1}{3}x + 2$

Equation $y = \frac{1}{3}x + 2$

Test 7—Question 8
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows a correct equation. A correct complete process is shown, but is not required. The response receives a Score Point 2.

SCORE POINT 1

8 What is the equation of the line that has a slope of $\frac{1}{3}$ and passes through the point (3, 3)? Write the equation on the line below.

Show All Work

$y - 3 = \frac{1}{3}(x - 3)$

$y - 3 = \frac{1}{3}x + 1$

$+3 \qquad +3$

$y = \frac{1}{3}x + 4$

Equation $y = \frac{1}{3}x + 4$

Test 7—Question 8
Score Point 1

This response shows a correct process for finding the equation, but a computational error is made when the student multiplies $\frac{1}{3}$ and $^{-}3$ and gets 1. Therefore, this response receives a Score Point 1.

Test 7—Question 8
Score Point 0

This response shows an incorrect answer and no process to determine the *y*-intercept. Therefore, this response receives a Score Point 0.

SCORE POINT 0

8 What is the equation of the line that has a slope of $\frac{1}{3}$ and passes through the point (3, 3)? Write the equation on the line below.

Show All Work

$3 = \frac{1}{3} \cdot 3 + b$

$y = mx + b$

$y = \text{slope} \cdot x + y - \text{int.}$

Equation $3 = \frac{1}{3} \cdot 3 + b$

Test 8—Question 1: Measurement

1 Amber is using $\frac{1}{2}$ fluid ounce of food coloring to change the color of 64 fluid ounces of water.

How many GALLONS of food coloring would she need to change the color of 448 gallons of water if she used the same ratio?

Show All Work

Answer _____ gallons

Exemplary Response:

- 3.5 gallons

Sample Process:

- $\frac{0.5}{64} = \frac{x}{448}$

$64x = (0.5)(448)$

$= 224$

$x = 3.5$

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

Test 8—Question 1
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 3.5 gallons. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 2

1 Amber is using $\frac{1}{2}$ fluid ounce of food coloring to change the color of 64 fluid ounces of water.

How many GALLONS of food coloring would she need to change the color of 448 gallons of water if she used the same ratio?

Show All Work

$448 \div 64 = 7 \times \frac{1}{2} = 3\frac{1}{2}$

Answer $3\frac{1}{2}$ gallons

Test 8—Question 1
Score Point 1

This response shows a correct complete process, but a computational error results in an incorrect answer. The computational error is made when the student multiplies $\frac{1}{2}$ and 7. Therefore, this response receives a Score Point 1.

SCORE POINT 1

1 Amber is using $\frac{1}{2}$ fluid ounce of food coloring to change the color of 64 fluid ounces of water.

How many GALLONS of food coloring would she need to change the color of 448 gallons of water if she used the same ratio?

Show All Work

$448 \div 64 = 7$
$\frac{1}{2} \cdot 7 = 7\frac{1}{2}$

Answer $7\frac{1}{2}$ gallons

SCORE POINT 0

1 Amber is using $\frac{1}{2}$ fluid ounce of food coloring to change the color of 64 fluid ounces of water.

How many GALLONS of food coloring would she need to change the color of 448 gallons of water if she used the same ratio?

Show All Work

448 ÷ 2 = 224

Answer 244 gallons

Test 8—Question 1
Score Point 0

This response shows an incorrect answer and an incorrect process. The student divides 448 by 2 instead of 64. Therefore, this response receives a Score Point 0.

Test 8—Question 2: Measurement

2 Carpet is to be installed in a rectangular living room that measures 18 feet by 24 feet.

How many square YARDS of carpeting are needed to cover the living room floor?

Show All Work

Answer _____ square yards

Exemplary Response:

- 48 square yards

Sample Process:

- 1 yard = 3 feet

So

$\frac{18 \text{ ft}}{3 \text{ ft}} = 6$ yards

$\frac{24 \text{ ft}}{3 \text{ ft}} = 8$ yards

$6 \times 8 = 48$

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

SCORE POINT 2

2 Carpet is to be installed in a rectangular living room that measures 18 feet by 24 feet.

How many square YARDS of carpeting are needed to cover the living room floor?

Show All Work

18 feet - 6 yards

8

×6

48 yards²

24 feet - 8 yards

Answer 48 square yards

Test 8—Question 2 Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 48 square yards. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 1

2 Carpet is to be installed in a rectangular living room that measures 18 feet by 24 feet.

How many square YARDS of carpeting are needed to cover the living room floor?

Show All Work

24 ft = 8 yd

18 ft =

24 ft = 8 yd

18 ft = 6 yd

8

6

54

Answer 54 square yards

Test 8—Question 2 Score Point 1

This response shows a correct complete process, but a computational error results in an incorrect answer. The computational error is made when the student multiplies 6 and 8. Therefore, this response receives a Score Point 1.

Test 8—Question 2
Score Point 0

This response shows an incorrect process resulting in an incorrect answer. The student does not convert feet to square yards. Therefore, this response receives a Score Point 0.

SCORE POINT 0

2 Carpet is to be installed in a rectangular living room that measures 18 feet by 24 feet.

How many square YARDS of carpeting are needed to cover the living room floor?

Show All Work

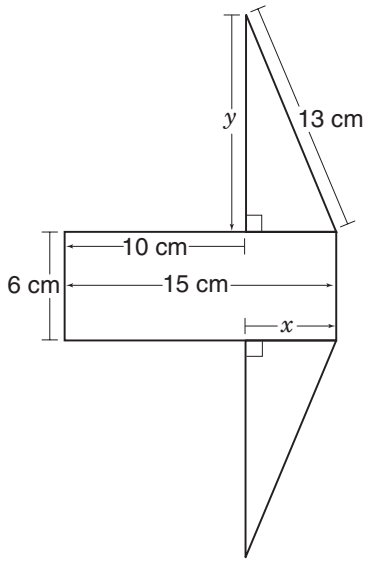
24
18
432

432

Answer 144 square yards

Test 8—Question 3: Problem Solving

3 Audrey drew the figure below using two congruent right triangles and a rectangle.



On the lines below, use words and symbols to explain how to find the missing measurements for x and y on Audrey's figure.

x: _____

_____

_____

y: _____

_____

_____

What is the area, in square centimeters, of Audrey's figure?

Show All Work

Answer _____ square centimeters

Exemplary Response:

Explanations equivalent to the following:

- x: Right triangles are congruent, so the base is 5 cm: 15 cm − 10 cm = 5 cm.

OR

- Other valid explanation

AND

- y: It is a right triangle so use $a^2 + b^2 = c^2$. $y^2 + 5^2 = 13^2$: $y = \sqrt{169 - 25}$ $\sqrt{144} = 12$, so $y = 12$ cm.

OR

- Other valid explanation

AND

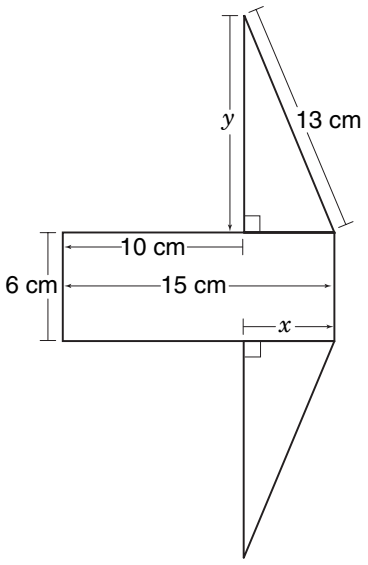
- 150 square centimeters

Rubric:

3 points	Exemplary response
2 points	Two correct components
1 point	One correct component
0 points	Other

SCORE POINT 3

3 Audrey drew the figure below using two congruent right triangles and a rectangle.



On the lines below, use words and symbols to explain how to find the missing measurements for x and y on Audrey's figure.

x: the length of the rectangle is 15 cm. 10 cm + x = 15 cm, so 15 cm - 10 cm = x = 5 cm

y: Pythagorean theorem is $a^2 + b^2 = c^2$. In this problem, $x^2 + y^2 = 13^2$. since we know x = 5, $25 + y^2 = 169$. 169 - 25 = 144. The square root of 144 = 12 = y

What is the area, in square centimeters, of Audrey's figure?

Show All Work

15
6
□: 90
△1: 30
△2: 30
150cm²

12
5
60/2

12
5
60/2

Answer 150 square centimeters

Test 8—Question 3
Score Point 3

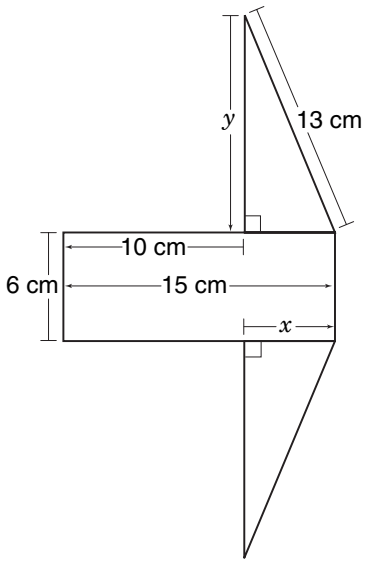
This response matches the exemplary response contained in the rubric. The student shows correct explanations of how to find *x* and *y* as well as the correct answer of 150 square centimeters. The response receives a Score Point 3.

Test 8—Question 3
Score Point 2

This response shows a correct explanation of how to find *x* and a correct answer of 150 square centimeters, but an incorrect explanation of how to find *y*. Therefore, this response receives a Score Point 2.

SCORE POINT 2

3 Audrey drew the figure below using two congruent right triangles and a rectangle.



On the lines below, use words and symbols to explain how to find the missing measurements for x and y on Audrey's figure.

x: To find x you would take 15 - 10 and get 5.

y: To find y you would take 6 × 2 and get 12.

What is the area, in square centimeters, of Audrey's figure?

Show All Work

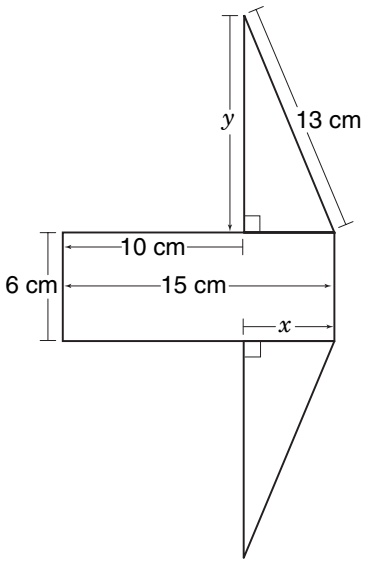
$$\begin{array}{r} 6 \\ \times 15 \\ \hline 90 \end{array} \qquad \begin{array}{r} 12 \\ \times\ 5 \\ \hline \end{array} \qquad \begin{array}{r} 60 \\ +\ 90 \\ \hline 150 \end{array}$$

60 ÷ 2 = 30 × 2 = 60

Answer 150 square centimeters

SCORE POINT 1

3 Audrey drew the figure below using two congruent right triangles and a rectangle.



On the lines below, use words and symbols to explain how to find the missing measurements for x and y on Audrey's figure.

x: to find x you would take 15 - 10 = which would be 5.

y: to find y you would take 13 - 3 = which would be 10.

What is the area, in square centimeters, of Audrey's figure?

Show All Work

10 × 6

Answer 60 square centimeters

Test 8—Question 3
Score Point 1

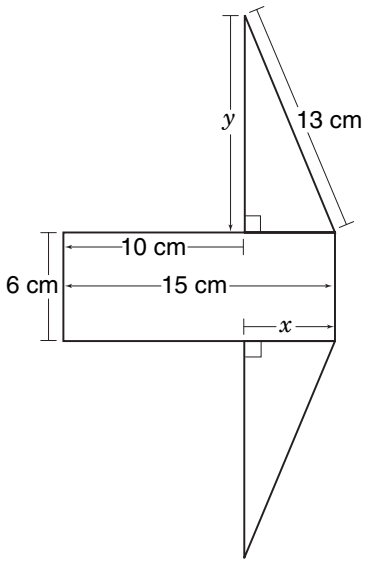
This response shows a correct explanation of how to find *x*, an incorrect explanation of how to find *y*, and an incorrect answer. Therefore, this response receives a Score Point 1.

Test 8—Question 3
Score Point 0

This response shows incorrect explanations of how to find *x* and *y*, and an incorrect answer. Therefore, this response receives a Score Point 0.

SCORE POINT 0

3 Audrey drew the figure below using two congruent right triangles and a rectangle.



On the lines below, use words and symbols to explain how to find the missing measurements for x and y on Audrey's figure.

x: 5 cm

y: 13 cm

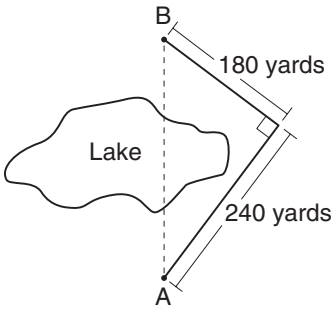
What is the area, in square centimeters, of Audrey's figure?

Show All Work

Answer 15 cm square centimeters

Test 8—Question 4: Geometry

4 Ms. Kelley hit her first golf shot 240 yards. She hit her second shot 180 yards, as shown in the diagram below.



If Ms. Kelley had hit the ball directly over the lake from point A to point B, what would be the distance, in yards, of the shot?

Show All Work

Answer _____ yards

Exemplary Response:

- 300 yards

Sample Process:

- $240^2 + 180^2 = x^2$

  $57{,}600 + 32{,}400 = x^2$

  $\sqrt{90{,}000} = \sqrt{x^2}$

  $300 = x$

OR

- Other valid process

Rubric:

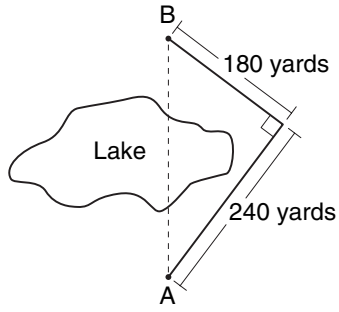
2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

Test 8—Question 4
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 300 yards. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 2

4 Ms. Kelley hit her first golf shot 240 yards. She hit her second shot 180 yards, as shown in the diagram below.



If Ms. Kelley had hit the ball directly over the lake from point A to point B, what would be the distance, in yards, of the shot?

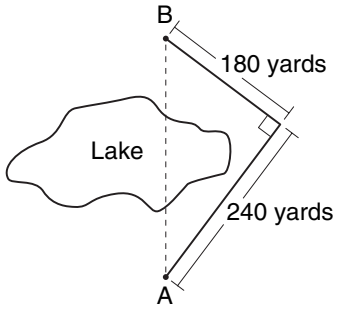
Show All Work

$$a^2 + b^2 = c^2$$
$$180^2 + 240^2 = c^2$$
$$32{,}400 + 57{,}600 = c^2$$
$$90{,}000 = c^2$$
$$300 = c$$

Answer 300 yards

SCORE POINT 1

4 Ms. Kelley hit her first golf shot 240 yards. She hit her second shot 180 yards, as shown in the diagram below.



If Ms. Kelley had hit the ball directly over the lake from point A to point B, what would be the distance, in yards, of the shot?

Show All Work

$$180^2 + 240^2 = c^2$$
$$32400 + 57600 = c^2$$
$$\sqrt{90300} = \sqrt{c^2}$$
$$300.5 = c$$

Answer 300.5 yards

Test 8—Question 4
Score Point 1

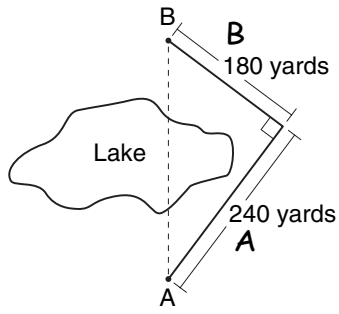
This response shows a correct complete process, but a computational error results in an incorrect answer. The computational error is made when the student adds 32,400 and 57,600 and gets 90,300 instead of 90,000. Therefore, this response receives a Score Point 1.

Test 8—Question 4
Score Point 0

This response shows an incomplete process resulting in an incorrect answer. The student does not take the square root of 90,000. Therefore, this response receives a Score Point 0.

SCORE POINT 0

4 Ms. Kelley hit her first golf shot 240 yards. She hit her second shot 180 yards, as shown in the diagram below.



If Ms. Kelley had hit the ball directly over the lake from point A to point B, what would be the distance, in yards, of the shot?

Show All Work

$$a^2 + b^2 = c^2$$
$$240^2 + 180^2 = c^2$$
$$57600 + 32400 = c^2$$
$$\frac{90{,}000}{} = \frac{c^2}{c}$$

Answer 90,000 yards

Test 8—Question 5: Problem Solving

5 Henry is planning to make spiced apple cider. His recipe calls for 6 cups of apple cider and $2\frac{1}{4}$ cups of pineapple juice. Henry plans to triple the recipe. The grocery store sells apple cider in 64-ounce bottles and pineapple juice in 16-ounce cans. How many bottles of apple cider and cans of pineapple juice does Henry need to buy?

Show All Work

Answer _____ bottles of apple cider

_____ cans of pineapple juice

Exemplary Response:

- 3 bottles of apple cider

AND

- 4 cans of pineapple juice

AND

- Correct complete process

Sample Process:

- 6 cups $\times$ 3 $=$ 18 cups

  18 cups $\times$ 8 ounces per cup $=$ 144 ounces

  144 ounces $\div$ 64 ounces per bottle $=$ 2.25 bottles

  $2\frac{1}{4}$ cups $\times$ 3 $=$ $6\frac{3}{4}$ cups $=$ 6.75 cups

  6.75 cups $\times$ 8 ounces per cup $=$ 54 ounces

  54 ounces $\div$ 16 ounces per can $=$ 3.375 cans

OR

- Other valid process

NOTE: Award a maximum of 2 points for correct complete process, with an error in computation.

Rubric:

3 points	Exemplary response
2 points	Two correct components
1 point	One correct component
0 points	Other

SCORE POINT 3

5 Henry is planning to make spiced apple cider. His recipe calls for 6 cups of apple cider and $2\frac{1}{4}$ cups of pineapple juice. Henry plans to triple the recipe. The grocery store sells apple cider in 64-ounce bottles and pineapple juice in 16-ounce cans. How many bottles of apple cider and cans of pineapple juice does Henry need to buy?

Show All Work

$\frac{6 \cdot 3 \cdot 8}{64} = \frac{144}{64} = 2.25$ $\frac{2\frac{1}{4} \cdot 8 \cdot 3}{16} = \frac{54}{16} = 3.375$

Answer 3 bottles of apple cider

4 cans of pineapple juice

Test 8—Question 5 Score Point 3

This response matches the exemplary response contained in the rubric. The student shows a correct complete process and the correct answer of 3 bottles of apple cider and 4 cans of pineapple juice. The response receives a Score Point 3.

SCORE POINT 2

5 Henry is planning to make spiced apple cider. His recipe calls for 6 cups of apple cider and $2\frac{1}{4}$ cups of pineapple juice. Henry plans to triple the recipe. The grocery store sells apple cider in 64-ounce bottles and pineapple juice in 16-ounce cans. How many bottles of apple cider and cans of pineapple juice does Henry need to buy?

Show All Work

6
× 8
48 × 3 = 64 | 144 = 225 = (3)

$6\frac{3}{4}$ $4\ ^{6}/_{8}$

48 + 6 = $\frac{52}{16}$ = 3.25 (4)

48
+ 6
54

Answer 3 bottles of apple cider

4 cans of pineapple juice

Test 8—Question 5 Score Point 2

This response shows the correct answers and a correct process, but there is an error in computation. The computational error is made when the student adds 48 and 6 and gets 52 instead of 54. Therefore, this response receives a Score Point 2.

Test 8—Question 5
Score Point 1

This response shows a correct answer for the number of cans of pineapple juice, an incorrect answer for the number of bottles of apple cider, and an incorrect process. Therefore, this response receives a Score Point 1.

SCORE POINT 1

5 Henry is planning to make spiced apple cider. His recipe calls for 6 cups of apple cider and $2\frac{1}{4}$ cups of pineapple juice. Henry plans to triple the recipe. The grocery store sells apple cider in 64-ounce bottles and pineapple juice in 16-ounce cans. How many bottles of apple cider and cans of pineapple juice does Henry need to buy?

Show All Work

24 cups

$$\frac{9}{4} \times \frac{3}{1} = \frac{27}{4} = 6\frac{3}{4}$$

Answer 8 bottles of apple cider

4 cans of pineapple juice

Test 8—Question 5
Score Point 0

This response shows an incorrect process resulting in incorrect answers. Therefore, this response receives a Score Point 0.

SCORE POINT 0

5 Henry is planning to make spiced apple cider. His recipe calls for 6 cups of apple cider and $2\frac{1}{4}$ cups of pineapple juice. Henry plans to triple the recipe. The grocery store sells apple cider in 64-ounce bottles and pineapple juice in 16-ounce cans. How many bottles of apple cider and cans of pineapple juice does Henry need to buy?

Show All Work

6c · 3 = 18 c
18c · 16 oz/cup = 288 oz.
288 oz. ÷ 64 oz./bottle = 4.5
4.5 ↑ = 5

2.25c · 3 = 6.75 c
6.75c · 16 oz./cup = 108 oz.
108 oz ÷ 16 oz./can 6.75
6.75 ↑ = 7

Answer 5 bottles of apple cider

7 cans of pineapple juice

Test 8—Question 6: Measurement

6 Sara's grandmother has a swimming pool in the shape of a rectangular prism in her back yard. The pool measures 24 feet long, 18.5 feet wide, and 5.5 feet deep across the entire pool.

What is the volume, in cubic feet, of the pool?

Show All Work

Answer _____ cubic feet

Exemplary Response:

- 2,442 cubic feet

Sample Process:

- $V = lwh$
  $= (24)(18.5)(5.5)$
  $= 2{,}442$

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

Test 8—Question 6
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 2,442 cubic feet. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 2

6 Sara's grandmother has a swimming pool in the shape of a rectangular prism in her back yard. The pool measures 24 feet long, 18.5 feet wide, and 5.5 feet deep across the entire pool.

What is the volume, in cubic feet, of the pool?

Show All Work

$$\begin{array}{r} 18.5 \\ \times\ 5.5 \\ \hline 24 \\ \hline 2442 \end{array}$$

Answer 2442 cubic feet

Test 8—Question 6
Score Point 1

This response shows a correct complete process, but an error results in an incorrect answer. The error is made when the student multiplies 24, 18.5, and 5.5 and gets 244.2 instead of 2,442. Therefore, this response receives a Score Point 1.

SCORE POINT 1

6 Sara's grandmother has a swimming pool in the shape of a rectangular prism in her back yard. The pool measures 24 feet long, 18.5 feet wide, and 5.5 feet deep across the entire pool.

What is the volume, in cubic feet, of the pool?

Show All Work

$24 \cdot 18.5 \cdot 5.5 = 244.2$

Answer 244.2 cubic feet

SCORE POINT 0

6 Sara's grandmother has a swimming pool in the shape of a rectangular prism in her back yard. The pool measures 24 feet long, 18.5 feet wide, and 5.5 feet deep across the entire pool.

What is the volume, in cubic feet, of the pool?

Show All Work

24
18.5
5.5

Answer 48 cubic feet

Test 8—Question 6
Score Point 0

This response shows an incorrect process resulting in an incorrect answer. The student adds the three measurements instead of multiplying. Therefore, this response receives a Score Point 0.

Test 8—Question 7: Algebra and Functions

7 Chelsea is finding the volume of a cylinder by solving the two equations shown below, where A is the area and V is the volume.

$$A = 3^2 \times 3.14$$
$$V = 16A$$

What is the volume, in cubic units, of the cylinder?

Show All Work

Answer _____ cubic units

Exemplary Response:

- 452.16 cubic units

Sample Process:

- $9 \times 3.14 = 28.26$

  $28.26 \times 16 = 452.16$ units^3

  or $= 452$ units^3

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

SCORE POINT 2

7 Chelsea is finding the volume of a cylinder by solving the two equations shown below, where A is the area and V is the volume.

$$A = 3^2 \times 3.14$$
$$V = 16A$$

What is the volume, in cubic units, of the cylinder?

Show All Work

$3^2 \times 3.14 = 28.26$

$16 \cdot 28.26$

Answer 452.16 cubic units

Test 8—Question 7 Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 452.16 cubic units. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 1

7 Chelsea is finding the volume of a cylinder by solving the two equations shown below, where A is the area and V is the volume.

$$A = 3^2 \times 3.14$$
$$V = 16A$$

What is the volume, in cubic units, of the cylinder?

Show All Work

$A = 3^2 \times 3.14$

$A = 9 \times 3.14$

$A = 28.26$

$U = 16 \cdot 28.26$

$$\begin{array}{r} {\scriptstyle 4\,1\;3} \\ 28.26 \\ \times \quad 16 \\ \hline 169\,56 \\ +\,28260 \\ \hline 453.16 \end{array}$$

$$\begin{array}{r} {\scriptstyle 1\;3} \\ 3.14 \\ \times \quad 9 \\ \hline 28.26 \end{array}$$

Answer 453.16 cubic units

Test 8—Question 7 Score Point 1

This response shows a correct complete process, but a computational error results in an incorrect answer. The computational error is made when the student multiplies 28.26 and 16 and gets 453.16 instead of 452.16. Therefore, this response receives a Score Point 1.

Test 8—Question 7
Score Point 0

This response shows an incomplete process resulting in an incorrect answer. The student does not multiply 28.26 by 16. Therefore, this response receives a Score Point 0.

SCORE POINT 0

7 Chelsea is finding the volume of a cylinder by solving the two equations shown below, where A is the area and V is the volume.

$$A = 3^2 \times 3.14$$
$$V = 16A$$

What is the volume, in cubic units, of the cylinder?

Show All Work

$A = 3^2 \times 3.14$

$A = 9 \times 3.14$

$A = 28.26$

Answer 28.26 cubic units

Test 8—Question 8: Measurement

8 Darius traveled a distance of 175 miles to visit his nephew.

If he drove continuously at an average rate of 50 miles per hour, how many hours did it take him to reach his destination?

Show All Work

Answer _____ hours

Exemplary Response:

- 3.5 hours

Sample Process:

- 175 ÷ 50 = 3.5

OR

- Other valid process

Rubric:

2 points	Exemplary response
1 point	Correct complete process; error in computation
0 points	Other

Test 8—Question 8
Score Point 2

This response matches the exemplary response contained in the rubric. The student shows the correct answer of 3.5 hours. A correct complete process is shown, but not required. The response receives a Score Point 2.

SCORE POINT 2

8 Darius traveled a distance of 175 miles to visit his nephew.

If he drove continuously at an average rate of 50 miles per hour, how many hours did it take him to reach his destination?

Show All Work

175 ÷ 50 = 3.5

Answer 3.5 hours

Test 8—Question 8
Score Point 1

This response shows a correct complete process, but a computational error results in an incorrect answer. The computational error is made when the student divides 175 by 50 and gets 9 instead of 3.5. Therefore, this response receives a Score Point 1.

SCORE POINT 1

8 Darius traveled a distance of 175 miles to visit his nephew.

If he drove continuously at an average rate of 50 miles per hour, how many hours did it take him to reach his destination?

Show All Work

$$\begin{array}{r} 9 \\ 50\overline{)175} \\ 145 \\ \hline 30 \end{array}$$

Answer 9 hours

SCORE POINT 0

8 Darius traveled a distance of 175 miles to visit his nephew.

If he drove continuously at an average rate of 50 miles per hour, how many hours did it take him to reach his destination?

Show All Work

$175 = 50 + x$

$-50 \quad -50$

$\frac{125}{60} = x$

Answer 2 hours

Test 8—Question 8
Score Point 0

This response shows an incorrect process resulting in an incorrect answer. The student subtracts 50 from 175 instead of dividing 175 by 50. Therefore, this response receives a Score Point 0.

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Grade 9
Mathematics

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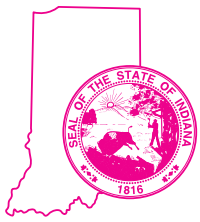

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